

December 20, 2022

Mr. Mitch Greger
Maryland Department of the Environment
Air Quality Compliance Program
Air and Radiation Management Administration
1800 Washington Boulevard, Suite 715
Baltimore, MD 21230-1720

SUBJECT: Montgomery County Resource Recovery Facility
2022 Compliance Test Report

Dear Mitch:

Enclosed please find the air emissions Compliance Test Report for the annual compliance test at the Montgomery County Resource Recovery Facility (MCRRF). The testing was performed by Testar, Inc., during September – November 2022. This report demonstrates compliance with the emission limitation provisions of the Maryland Department of the Environment, Air and Radiation Management Administration (ARMA), Title V Operating Permit No. 24-031-01718. A summary of the results is attached to this letter.

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

If you have any questions regarding these documents, please contact me at (301) 691-9004.

Best regards,



Michael Pope
Facility Manager

Attachments (Report/Flash Drive)

cc:	EPA Region III	(w/Exec Summary)
	Joe Walsh	(w/Exec Summary)
	Lonnie Heflin	(w/Exec Summary/Flash Drive)
	Joe LaDana	(w/Exec Summary/Flash Drive)
	John Schott	(w/Exec Summary/Flash Drive)

**EMISSIONS TESTING REPORT 22050
Text and Appendices**

PERFORMED FOR:

**COVANTA ENERGY GROUP, INC.
Morristown, New Jersey**

at the

**Montgomery County Resource Recovery Facility
Dickerson, Maryland
Units 1, 2, and 3 SDA Inlets and Stacks
September-November 2022**

by

**TESTAR Engineering, PC
5100 Unicon Drive, Suite 102
Wake Forest, North Carolina 27587
License Number C-3896
919/957-9500**

**PE CERTIFICATION
REPORT 22050**

I hereby certify that I have personally examined and am familiar with the information submitted herein. Based upon my own knowledge and my inquiry of those individuals responsible for obtaining the information presented, the foregoing information is true, accurate and complete. I am aware that this information is being requested for the purpose of determining compliance with local, state, and federal laws and may be submitted to appropriate governmental regulatory agencies for those purposes. I am aware that there are significant penalties for submitting false information to such agencies, including the possibility of fine and imprisonment.

Signature

_____

Date:

12/12/22

Gary L. Williams, PE, QSTI
Director

Professional Engineer, State of North Carolina

Seal Number 025432



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1.0 INTRODUCTION

1.1 General

Covanta Energy Group, Inc. (Covanta) operates the Montgomery County Resource Recovery Facility in Dickerson, Maryland. Covanta contracted TESTAR Engineering, PC to conduct an air emissions testing program to quantify specific emissions from Units 1, 2, and 3 for determining compliance status. The testing program was conducted between September 13 and November 10, 2022 by TESTAR Engineering under the supervision of Mr. Rick Kohler of Covanta Energy Group, Inc.

1.2 Test Personnel

Table 1-1 presents the personnel that were involved in the testing program.

Table 1-1
Test Personnel

Affiliation	Personnel Responsibility
Covanta Energy Group, Inc.	Rick Kohler Test Coordinator
TESTAR Engineering, PC	William Snipes Project Manager
	Chris Wrenn Project Manager
	Jeff Aims Field Laboratory Manager
	Herb Dixon Test Engineer
	Brad Pittard Test Engineer
	Matt Warner Test Engineer
	Sean Daley Test Engineer
	Joe Daley Test Engineer
	Jorge Vazquez Test Engineer
	Forrest Peed Test Engineer
	Brad Ouzts Test Engineer
	Charles Nahrebecki CEM Test Engineer

1.3 Test Parameters and Run Numbers

Tables 1-2, 1-3, and 1-4 present the sampling locations, sampling methods, flue gas parameters, test dates, test times, and run numbers for Units 1, 2, and 3, respectively. Table 1-5 presents the sampling locations, sampling methods, flue gas parameters, test dates, test times, and run numbers for the Ash System. Table 1-6 presents the usage of EPA Methods 2, 3, and 4 data.

Table 1-2
Unit 1 Test Sequence

Test Location	Sampling Method	Flue Gas Parameter	Test Date	Test Time	Run Number
Unit 1 SDA Inlet	EPA M29	Mercury	09/14/22	0924-1148	1-I-M29-1
			09/14/22	1536-1749	1-I-M29-3
			09/15/22	1302-1518	1-I-M29-4
Unit 1 Stack	EPA M027	Ammonia	09/22/22	1357-1505	1-S-M027-1
			09/22/22	1624-1735	1-S-M027-2
			09/23/22	0818-0924	1-S-M027-3
Unit 1 Stack	EPA M23	Dioxins/Furans	09/16/22	0926-1335	1-S-M23-1
			09/22/22	0958-1425	1-S-M23-3
			09/22/22	1452-1903	1-S-M23-4
			09/14/22	0924-1148	1-S-M29-1
Unit 1 Stack	EPA M29	Metals	09/14/22	1235-1452	1-S-M29-2
			09/14/22	1536-1749	1-S-M29-3
			09/15/22	1302-1518	1-S-M29-4
			09/14/22	0924-1148	1-S-M5/202-1
Unit 1 Stack	EPA M5/202	Particulate (Filterable and Condensable)	09/14/22	1235-1452	1-S-M5/202-2
			09/14/22	1536-1749	1-S-M5/202-3
			09/15/22	1028-1134	1-S-M8-1
Unit 1 Stack	EPA M8	Sulfuric Acid Mist	09/16/22	1056-1205	1-S-M8-2
			09/22/22	1145-1257	1-S-M8-3
			09/15/22	0906-1012	1-S-M13B-1
Unit 1 Stack	EPA M13B	Total Fluorides as F	09/15/22	1200-1307	1-S-M13B-2
			09/23/22	0819-0925	1-S-M13B-4
			09/19/22	0932-1342	1-S-CEM-1,2
Unit 1 Stack	EPA M3A & M25A	Total Hydrocarbons	09/19/22	1352-1501	1-S-CEM-3,4
			09/19/22	1510-1619	1-S-CEM-5,6
			09/14/22	Various	CEMS
Facility CEMS	Facility CEMS	HCl, SO ₂ , NO _x , CO	09/14/22	1000-1100	1-S-COM-1
Facility COMS	Facility COMS	Opacity by COMS	09/14/22	1300-1400	1-S-COM-2
Facility COMS	Facility COMS	Opacity by COMS	09/14/22	1600-1700	1-S-COM-3

Table 1-3
 Unit 2 Test Sequence

Test Location	Sampling Method	Flue Gas Parameter	Test Date	Test Time	Run Number
Unit 2 SDA Inlet	EPA M29	Mercury	11/10/22	0820-1048	2-I-M29-1
			11/10/22	1119-1340	2-I-M29-2
			11/10/22	1406-1624	2-I-M29-3
Unit 2 Stack	EPA M027	Ammonia	10/26/22	1237-1348	2-S-M027-1
			10/26/22	1530-1638	2-S-M027-2
			10/26/22	1701-1809	2-S-M027-3
	EPA M23	Dioxins/Furans and PAHS	10/26/22	1013-1421	2-S-M23-1
			10/25/22	1448-1856	2-S-M23-2
			10/26/22	0858-1307	2-S-M23-3
	EPA M29	Metals	11/10/22	0820-1048	2-S-M29-1
			11/10/22	1119-1340	2-S-M29-2
			11/10/22	1406-1624	2-S-M29-3
EPA M5/202	Particulate (Filterable and Condensable)	11/10/22	0821-1048	2-S-M5/202-1	
		11/10/22	1119-1340	2-S-M5/202-2	
		11/10/22	1406-1624	2-S-M5/202-3	
EPA M8	Sulfuric Acid Mist	10/26/22	1028-1137	2-S-M8-1	
		10/26/22	1404-1310	2-S-M8-2	
		10/26/22	1701-1809	2-S-M8-3	
EPA M13B	Total Fluorides as F	10/26/22	0820-0929	2-S-M13B-1	
		10/26/22	1404-1310	2-S-M13B-2	
		10/26/22	1530-1638	2-S-M13B-3	
EPA M3A & M25A	Total Hydrocarbons	09/20/22	1004-1205	2-S-CEM-1,2	
		09/20/22	1337-1521	2-S-CEM-3,4	
		09/20/22	1530-1709	2-S-CEM-5,6	
Facility CEMS		HCl, SO ₂ , NO _x , CO	11/10/22	Various	CEMS
Facility COMS		Opacity by COMS	11/10/22	0900-1000	2-S-COM-1
			11/10/22	1200-1300	2-S-COM-2
			11/10/22	1500-1600	2-S-COM-3

Table 1-4
Unit 3 Test Sequence

Test Location	Sampling Method	Flue Gas Parameter	Test Date	Test Time	Run Number
Unit 3 SDA Inlet	EPA M29	Mercury	09/20/22	0952-1254	3-I-M29-3
			11/08/22	0840-1056	3-I-M29-5
			11/08/22	1123-1335	3-I-M29-6
Unit 3 Stack	EPA M027	Ammonia	10/25/22	1144-1250	3-S-M027-1
			10/25/22	1615-1722	3-S-M027-2
			10/26/22	1831-1939	3-S-M027-3
	EPA M23	Dioxins/Furans	11/08/22	1400-1901	3-S-M23-1
			11/09/22	0810-1216	3-S-M23-2
			11/09/22	1226-1630	3-S-M23-3
	EPA M29	Metals	09/20/22	0953-1254	3-S-M29-3
			11/08/22	0840-1056	3-S-M29-5
			11/08/22	1123-1335	3-S-M29-6
EPA M5/202	Particulate (Filterable and Condensable)	09/20/22	0952-1256	3-S-M5/202-3	
		11/08/22	0840-1056	3-S-M5/202-5	
		11/08/22	1123-1335	3-S-M5/202-6	
EPA M8	Sulfuric Acid Mist	10/25/22	0830-0936	3-S-M8-3	
		10/25/22	1309-1440	3-S-M8-4	
		10/25/22	1740-1846	3-S-M8-5	
EPA M13B	Total Fluorides as F	10/25/22	1010-1119	3-S-M13B-3	
		10/25/22	1448-1555	3-S-M13B-4	
		10/26/22	1831-1939	3-S-M13B-5	
EPA M3A & M25A	Total Hydrocarbons	09/21/22	0956-1118	3-S-CEM-1,2	
		09/21/22	1130-1239	3-S-CEM-3,4	
		09/21/22	1252-1401	3-S-CEM-5,6	
Facility CEMS		HCl, SO ₂ , NO _x , CO	11/08/22	Various	CEMS
Facility COMS		Opacity by COMS	09/20/22	1000-1100	3-S-COM-3
			11/08/22	0900-1000	3-S-COM-5
			11/08/22	1200-1300	3-S-COM-6

Table 1-5
Ash System Test Sequence

Test Location	Sampling Method	Flue Gas Parameter	Test Date	Test Time	Run Number
Ash Handling System	EPA M22	Fugitive Emissions	09/19/22	1530-1640	M22-1
			09/20/22	1018-1128	M22-2
			09/21/22	1037-1147	M22-3

Table 1-6
Utilization of EPA Method 2, 3, and 4 Data

Runs Requiring Additional Information	Runs Providing Air Flow Rate and Moisture Data	Runs Providing Flue Gas Composition Data
1-S-M5/202-1	1-S-M5/202-1	1-S-M29-1
1-S-M5/202-2	1-S-M5/202-2	1-S-M29-2
1-S-M5/202-3	1-S-M5/202-3	1-S-M29-3
1-S-M8-2	1-S-M8-2	1-S-M23-1
1-S-M8-3	1-S-M8-3	1-S-M23-3
1-S-M13B-3	1-S-M13B-3	1-S-M23-2
1-S-M027-1	1-S-M027-1	1-S-M23-3
1-S-M027-2	1-S-M027-2	1-S-M23-4
1-S-M027-3	1-S-M027-3	1-S-M13B-4
1-S-CEM-1,2,3	1-S-M2/4-1,2,3	1-S-CEM-1,2,3
1-S-CEM-4,5,6	1-S-M2/4-4,5,6	1-S-CEM-4,5,6
1-S-CEM-7,8,9	1-S-M2/4-7,8,9	1-S-CEM-7,8,9
2-I-MM26-1	NA	2-I-M29-1
2-S-M5/202-1	2-S-M5/202-1	2-S-M29-1
2-S-M5/202-2	2-S-M5/202-2	2-S-M29-2
2-S-M5/202-3	2-S-M5/202-3	2-S-M29-3
2-S-M13B-2	2-S-M13B-2	2-S-M8-2
2-S-M13B-3	2-S-M13B-3	2-S-M027-2
2-S-M8-3	2-S-M8-3	2-S-M027-3
2-S-M027-3	2-S-M027-3	2-S-M8-3
2-S-CEM-1,2,3	2-S-M2/4-1,2,3	2-S-CEM-1,2,3
2-S-CEM-4,5,6	2-S-M2/4-4,5,6	2-S-CEM-4,5,6
2-S-CEM-7,8,9	2-S-M2/4-7,8,9	2-S-CEM-7,8,9
3-S-M5/202-3	3-S-M5/202-3	3-S-M29-3
3-S-M5/202-5	3-S-M5/202-5	3-S-M29-5
3-S-M5/202-6	3-S-M5/202-6	3-S-M29-6
3-S-M13B-5	3-S-M13B-5	3-S-M027-3
3-S-M027-2	3-S-M027-2	3-S-M8-2
3-S-M027-3	3-S-M027-3	3-S-M8-3
3-S-CEM-1,2,3	3-S-M2/4-1,2,3	3-S-CEM-1,2,3
3-S-CEM-4,5,6	3-S-M2/4-4,5,6	3-S-CEM-4,5,6
3-S-CEM-7,8,9	3-S-M2/4-7,8,9	3-S-CEM-7,8,9

2.0 SUMMARY OF RESULTS

2.1 Report Organization

The results of the testing project are summarized in Section 2. The process tested is discussed in Section 3. The sampling and analytical methods utilized are discussed in Section 4 while the Quality Assurance/Quality Control results are presented in Section 5. Appendix A contains detailed results of the testing program. Appendix B contains the field data that was collected and Appendix C contains the analytical results. Appendix D contains all pertinent testing equipment calibration data. Appendix E contains data sheets of aborted test runs. Refer to the Table of Contents and the List of Tables and Figures for a complete reference with appropriate page numbers.

2.2 Presentation of Results

Tables 2-1, 2-2, and 2-3 present the results of the emissions testing project for Unit 1, Unit 2, and Unit 3, respectively. A more detailed summary of the sampling gas parameters is presented in Appendix A.

2.3 Physical Obstructions at the Unit 1 SDA Inlet Test Location

An obstruction exists at the Unit 1 SDA Inlet test location. There is four and one-half (4.5) feet of clearance between the six test ports and an adjacent building. The longest test probe that can physically access the test ports is a four feet effective (48") probe. Using this maximum probe length, point 1 (25 5/8") and point 2 (38 3/4") of the required five points can be sampled in each test port. Point 3 (52") is missed by 4". Point 4 (65 1/4") and point 5 (78 3/8") cannot be sampled. Therefore, points 1, 2, and 3 (4" short) were sampled in each test port for a total of 18 test points as opposed to the required 30 points for the Unit 1 SDA Inlet.

2.4 Facility CEMS Data

The facility CEMS were utilized for the hydrogen chloride, sulfur dioxide, nitrogen oxides, and carbon monoxide concentrations. The facility data was provided in 1 hour, 3 hour, 4 hour, and 24 hour averages as necessary. This data is contained in Appendix B.

2.5 Fugitive Emissions Results

EPA Method 22 test runs were performed for fugitive emissions on the ash handling system building and transfer points. No periods of visible fugitive emissions were observed during the observation period. The field data sheets are located in Appendix B.

Table 2-1
Summary of Emissions
Unit 1

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
Unit 1 SDA Inlet Concentrations, @ 7% O₂					
Hydrogen Chloride, ppmvd – 1 hr ¹	516	---	---	516	NA
Mercury, mg/DSCM	0.0461	0.0490	0.0858	0.0603	NA
Sulfur Dioxide, ppmvd – 3 hr ¹	135	120	81	112	NA
Sulfur Dioxide, ppmvd – 24 hr ¹	107	---	---	107	NA
Unit 1 Stack Concentrations @ 7% O₂					
Ammonia, ppmvd	4.01	5.70	6.00	5.24	NA
Carbon Monoxide, ppmvd – 1 hr ¹	17	19	17	18	200
Carbon Monoxide, ppmvd – 4 hr ¹	22	---	---	22	100
Carbon Monoxide, ppmvd – 24 hr ¹	23	---	---	23	50
Dioxins/Furans, ng/DSCM	1.35	1.95	1.50	1.60	30
Dioxins/Furans, ng/DSCM, '89TEF	0.0124	0.0185	0.0165	0.0158	NA
Hydrogen Chloride, ppmvd – 1 hr ¹	15	---	---	15	25
Metals					
Cadmium, mg/DSCM	0.000236	0.000285	0.000173	0.000232	0.035
Lead, mg/DSCM	0.00314	0.00397	0.00185	0.00299	0.40
Mercury, mg/DSCM	0.00357	0.00343	0.00374	0.00358	0.050
Nitrogen Oxides, ppmvd – 24 hr ¹	84	---	---	84	180
Opacity by Facility COMS, %	0.2	0.2	0.3	0.2	10
Particulate, mg/DSCM	1.68	1.31	1.38	1.45	25
Particulate, Gr/DSCF	0.000733	0.000571	0.000601	0.000635	0.011
Sulfur Dioxide, ppmvd – 3 hr ¹	2	1	0	1	30
Sulfur Dioxide, ppmvd – 24 hr ¹	1	---	---	1	29
Total Fluorides as F, ppmvd	< 0.178	< 0.181	< 0.170	< 0.176	NA
Total Non-Methane Hydrocarbons as Carbon, ppmvd	0.285	0.531	0.239	0.352	NA
Unit 1 Stack Concentrations @ 12% CO₂					
Metals					
Beryllium, ug/DSCM	<0.0379	<0.0413	<0.0390	<0.0394	0.82
Lead, mg/DSCM	0.00312	0.00400	0.00186	0.00300	2.5
Mercury, mg/DSCM	0.00355	0.00345	0.00377	0.00359	3.4
Particulate, Gr/DSCF	0.000729	0.000577	0.000605	0.000637	0.01
Sulfuric Acid Mist, mg/DSCM	<0.0413	<0.0333	<0.0421	<0.0389	46
Total Fluorides as F, mg/DSCM	< 0.151	< 0.154	< 0.145	< 0.150	7.1
Total Non-Methane Hydrocarbons as Carbon, mg/DSCM	0.139	0.260	0.120	0.173	10
Unit 1 Stack					
Mercury, lb/MMBtu	3.20E-06	3.08E-06	3.36E-06	3.21E-06	NA
Unit 1 RE%, based upon concentrations @ 7% O₂					
HCl Rem. Eff., ppmvd – 1 hr ¹	97.0	---	---	97.0	>95%
Hg Removal Efficiency, ug/DSCM	92.3	93.0	95.6	93.6	>85%
SO ₂ Rem. Eff., ppmvd – 3 hr ¹	98	99	100	99	>85%
SO ₂ Rem. Eff., ppmvd – 24 hr ¹	100	---	---	100	>75%

¹ - Data provided by facility CEMs. Hydrogen chloride (HCl) data presented is the average of 24 one-hour data points. A couple list of the 24 hour HCl data is located in Appendix B.

Table 2-2
Summary of Emissions
Unit 2

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
Unit 2 SDA Inlet Concentrations, @ 7% O₂					
Hydrogen Chloride, ppmvd – 1 hr ¹	654	---	---	654	NA
Mercury, mg/DSCM	0.0472	0.0221	0.0464	0.0385	NA
Sulfur Dioxide, ppmvd – 3 hr ¹	44	28	44	39	NA
Sulfur Dioxide, ppmvd – 24 hr ¹	58	---	---	58	NA
Unit 2 Stack Concentrations @ 7% O₂					
Ammonia, ppmvd	0.913	4.81	3.64	3.12	NA
Carbon Monoxide, ppmvd – 1 hr ¹	2	3	3	3	200
Carbon Monoxide, ppmvd – 4 hr ¹	2	---	---	2	100
Carbon Monoxide, ppmvd – 24 hr ¹	5	---	---	5	50
Dioxins/Furans, ng/DSCM	1.76	2.84	1.62	2.07	30
Dioxins/Furans, ng/DSCM, '89TEF	0.0246	0.0390	0.0189	0.0278	NA
Hydrogen Chloride, ppmvd – 1 hr ¹	13	---	---	13	25
Metals					
Cadmium, mg/DSCM	0.000935	0.000789	0.000828	0.000851	0.035
Lead, mg/DSCM	0.00630	0.00737	0.00662	0.00743	0.40
Mercury, mg/DSCM	0.00135	0.00171	0.00187	0.00164	0.050
Nitrogen Oxides, ppmvd – 24 hr ¹	86	---	---	86	180
Opacity by Facility COMS, %	0.0	0.0	0.0	0.0	10
Particulate, mg/DSCM	1.67	2.00	1.91	1.88	25
Particulate, Gr/DSCF	0.000730	0.000873	0.000836	0.000813	0.011
Sulfur Dioxide, ppmvd – 3 hr ¹	0	0	1	0	30
Sulfur Dioxide, ppmvd – 24 hr ¹	1	---	---	1	29
Total Fluorides as F, ppmvd	<0.186	<0.170	<0.170	<0.175	NA
Total Non-Methane Hydrocarbons as Carbon, ppmvd	2.95	1.86	1.83	2.21	NA
Unit 2 Stack Concentrations @ 12% CO₂					
Metals					
Beryllium, ug/DSCM	<0.0355	<0.0391	<0.0383	<0.0378	0.82
Lead, mg/DSCM	0.00864	0.0755	0.00679	0.00786	2.5
Mercury, mg/DSCM	0.00141	0.00175	0.0192	0.00169	3.4
Particulate, Gr/DSCF	0.000760	0.000894	0.000858	0.000837	0.01
Sulfuric Acid Mist, mg/DSCM	0.0495	0.0523	0.109	0.0704	46
Total Fluorides as F, mg/DSCM	<0.183	<0.148	<0.147	<0.153	7.1
Total Non-Methane Hydrocarbons as Carbon, mg/DSCM	1.43	0.894	0.896	1.07	10
Unit 2 Stack					
Mercury, lb/MMBtu	1.21E-06	1.54E-06	1.68E-06	1.48E-06	NA
Unit 2 RE%, based upon concentrations @ 7% O₂					
HCl Rem. Eff., ppmvd – 1 hr ¹	98.1	---	---	98.1	>95%
Hg Removal Efficiency, ug/DSCM	97.1	92.2	96.0	95.1	>85%
SO ₂ Rem. Eff., ppmvd – 3 hr ¹	100	100	99	100	>85%
SO ₂ Rem. Eff., ppmvd – 24 hr ¹	100	---	---	100	>75%

¹ - Data provided by facility CEMs. Hydrogen chloride (HCl) data presented is the average of 24 one-hour data points. A couple list of the 24 hour HCl data is located in Appendix B.

Table 2-3
Summary of Emissions
Unit 3

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
Unit 3 SDA Inlet Concentrations, @ 7% O₂					
Hydrogen Chloride, ppmvd – 1 hr ¹	685	---	---	685	NA
Mercury, mg/DSCM	0.102	0.0485	0.0570	0.0693	NA
Sulfur Dioxide, ppmvd – 3 hr ¹	89	176	82	116	NA
Sulfur Dioxide, ppmvd – 24 hr ¹	123	---	---	123	NA
Unit 3 Stack Concentrations @ 7% O₂					
Ammonia, ppmvd	3.52	7.34	1.86	4.24	NA
Carbon Monoxide, ppmvd – 1 hr ¹	1	0	1	1	200
Carbon Monoxide, ppmvd – 4 hr ¹	1	---	---	1	100
Carbon Monoxide, ppmvd – 24 hr ¹	3	---	---	3	50
Dioxins/Furans, ng/DSCM	3.57	4.84	4.10	4.17	30
Dioxins/Furans, ng/DSCM, '89TEF	0.0342	0.0537	0.0395	0.0425	NA
Hydrogen Chloride, ppmvd – 1 hr ¹	15	---	---	15	25
Metals					
Cadmium, mg/DSCM	0.0211	0.000412	0.000328	0.000949	0.035
Lead, mg/DSCM	0.0254	0.00498	0.00437	0.0116	0.40
Mercury, mg/DSCM	0.00444	0.00200	0.00202	0.00282	0.050
Nitrogen Oxides, ppmvd – 24 hr ¹	71	---	---	71	180
Opacity by Facility COMS, %	0.6	0.9	0.9	0.8	10
Particulate, mg/DSCM	10.8	1.27	1.86	4.63	25
Particulate, Gr/DSCF	0.00471	0.000553	0.000813	0.00203	0.011
Sulfur Dioxide, ppmvd – 3 hr ¹	0	2	0	1	30
Sulfur Dioxide, ppmvd – 24 hr ¹	1	---	---	1	29
Total Fluorides as F, ppmvd	<0.168	<0.168	<0.174	<0.170	NA
Total Non-Methane Hydrocarbons as Carbon, ppmvd	2.00	1.95	0.685	1.54	NA
Unit 3 Stack Concentrations @ 12% CO₂					
Metals					
Beryllium, ug/DSCM	<0.0397	<0.0341	<0.0356	<0.0365	0.82
Lead, mg/DSCM	0.0259	0.00483	0.00424	0.0117	2.5
Mercury, mg/DSCM	0.00454	0.00194	0.00196	0.00281	3.4
Particulate, Gr/DSCF	0.00481	0.000536	0.000790	0.00205	0.01
Sulfuric Acid Mist, mg/DSCM	0.0584	0.0438	0.0389	0.0470	46
Total Fluorides as F, mg/DSCM	<0.144	<0.142	<0.149	<0.145	7.1
Total Non-Methane Hydrocarbons as Carbon, mg/DSCM	1.00	0.970	0.340	0.772	10
Unit 3 Stack					
Mercury, lb/MMBtu	3.99E-06	1.79E-06	1.81E-06	2.53E-06	NA
Unit 3 RE%, based upon concentrations @ 7% O₂					
HCl Rem. Eff., ppmvd – 1 hr ¹	97.7	---	---	97.7	>95%
Hg Removal Efficiency, ug/DSCM	95.6	95.9	96.5	96.0	>85%
SO ₂ Rem. Eff., ppmvd – 3 hr ¹	100	99	100	100	>85%
SO ₂ Rem. Eff., ppmvd – 24 hr ¹	100	---	---	100	>75%

¹ - Data provided by facility CEMs. Hydrogen chloride (HCl) data presented is the average of 24 one-hour data points. A couple list of the 24 hour HCl data is located in Appendix B.

Table 2-4
Fugitive Emissions Summary

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
Fugitive Emissions, % of time	0	0	0	0	5

2.6 Opacity Results

Opacity was quantified utilizing the facility's Continuous Opacity Monitoring (COM) monitors per 40CFR 60.11 (e) (5) on each stack. The facility COMS data is located in Appendix B.

2.7 Total Hydrocarbon Data

Continuous Emissions Monitoring (CEM) data for total hydrocarbons (THC) was provided by the reference method CEMS. Two 30-minute test runs were combined to represent one 60-minute THC test run. The air flow rates from concurrent testing were utilized to calculate the emission rates of total hydrocarbons (THC). EPA Method 25A was conducted for total hydrocarbons and the assumption was made that all hydrocarbons were non-methane for comparison to the permit limit.

2.8 Sulfuric Acid Mist Results

The Source Test Plan submitted to the Maryland Department of the Environment for pre-test approval requested a method modification to analyze the sulfuric acid mist samples using ion chromatography rather than the Thorin titration per EPA Method 8. The sulfuric acid mist results presented in this report were analyzed using ion chromatography techniques. Ion chromatography is more accurate because it avoids interferences that are inherent in the titration procedure. Mr. Gary McAlister of the USEPA has stated his "technical opinion that analyzing EPA Method 8 samples for sulfuric acid mist by IC is as accurate as analyzing the samples by the Thorin titrations as specified in EPA Method 8".

2.9 Metals Reagent Blank Corrections

Chromium, lead, and nickel were detected at low levels in the reagent blank. In accordance with EPA Method 29, Sections 12.6 and 12.7, the test run catch weights were corrected for the blank values.

2.10 Non-detected Values

The results are presented using a worst-case scenario. All non-detected results were used as values for calculation purposes and the result is preceded by a "<" symbol. All non-detected results were used as a zero when calculating total catch weights for samples that had both a positive catch weight for one or more fractions and also non-detected fraction(s). When averaging across a set of three test runs, non-detected results were treated as values. Any average result that includes a non-detected value includes a "<" symbol in front of the result.

2.11 Duplicate Analyses

Runs 1-S-M29-2, 2-S-M29-2, and 3-S-M29-5 were analyzed in duplicate for metals. All samples for mercury were analyzed in duplicate. All samples for hydrogen chloride were analyzed in duplicate. The average of the duplicate analyses were used for reporting purposes.

2.12 Dioxins/Furans Results and EMPC Values

In accordance with EPA Method 23, Section 9.9, all dioxins/furans results that were below the minimum detection limit (ND) were treated as zero when averaging or totaling the results. All dioxins/furans results that were an estimated maximum possible concentration (EMPC) are presented using the EMPC value as a positive catch when calculating the results.

2.13 PAH Results

Certain PAHS, naphthalene and some naphthalene analogs (acenaphthene and 2-methylnaphthalene) are artifacts of the XAD-2 resin manufacturing process. The difficulties in completely removing these PAHs from the XAD-2 resin and further potential artifact production during the analytical procedures preclude reliable PAH results. Therefore, results presented in this report do not include the contribution from naphthalene and its derivatives (acenaphthene and 2-methylnaphthalene). A complete data set can be found in Appendix A.

All PAH results that were below the minimum detection limit (ND) were treated as positive catches when averaging or totaling the results.

2.14 Voided Test Runs

Test run 1-S-M29-2 (and simultaneous run 1-I-M29-2) was voided due to sampling contamination. During the test run, the sampling nozzle made contact with a facility CEMs probe while in the stack.

Test run 3-S-M29-1 (and simultaneous run 3-I-M29-1) and test run 3-S-M5/202-1 were voided for a baghouse malfunction, due to a bag seating issue. Test runs 3-S-M13B-1 and 3-S-M13B-1 were performed immediately prior to 3-S-M29-1, and logically would be voided due to the same issue.

Test run 3-S-M29-2 (and simultaneous run 3-I-M29-2) and test run 3-S-M5/202-2 were voided for a baghouse malfunction, due to a detached bag which had fallen. Test runs 3-S-M13B-2 and 3-S-M8-2 were performed immediately after to 3-S-M29-1, and logically would be voided due to the same issue.

Test run 3-S-M29-4 (and simultaneous run 3-I-M29-4) and test run 3-S-M5/202-4 were voided due to interruption of the baghouse cleaning cycle.

Test run 1-S-M23-2 and test run 1-S-M13B-3 were voided due to a baghouse malfunction. Two (2) damaged bags were found in Unit 1.

In all cases above, additional test runs were performed to provide the necessary three (3) sampling runs per parameter to demonstrate compliance. Appendix E contains the data sheets of these voided test runs

3.0 PROCESS DESCRIPTION AND OPERATION

The Montgomery County Resource Recovery Facility has a design capacity to process up to 1800 tons of solid waste each day, generating up to 63 megawatts of electricity. The facility was designed and built by Ogden Projects and is operated by Covanta Montgomery, Inc. Each of the three (3) Martin GmbH waterwall furnaces processes up to 600 tons of waste per day. Waste is combusted at furnace temperatures exceeding 1,800 degrees Fahrenheit and reduced to an inert ash residue. Before leaving the facility, combustion air is directed through technologically advanced air pollution control equipment consisting of spray dryer absorbers (SDA), activated carbon injection, and fabric filter baghouses.

4.0 SAMPLING AND ANALYTICAL METHODS

This section briefly describes the sampling and analytical procedures that were used and any deviations from the methods. Figure 4-1 depicts cross-sections of the SDA Inlet test location. Figure 4-2 depicts cross-sections of the Stack test location.

4.1 EPA Methods 1-4 – Air Flow Rate and Moisture

EPA Methods 1 through 4 were utilized in conjunction with each isokinetic test method. EPA Method 1 was used to determine the location of the sampling points. EPA Method 2 was used to measure the flue gas flow rate. EPA Method 3 was used to determine the flue gas molecular weight. EPA Method 4 was used to determine the flue gas moisture content. The information provided by these methods was used in determining isokinetics, parameter concentrations, and parameter emission rates.

4.2 EPA Methods 5 and 202 – Particulate (Filterable and Condensable)

Particulate (filterable and condensable) emissions and concentrations were determined utilizing a combined EPA Method 5 and 202 sampling train. EPA Method 202 was revised as of January 1, 2011. The sampling train consisted of a glass nozzle, a heated glass probe, a heated tared quartz filter, a vertical water-cooled condenser, a jumbo impinger to serve as a water knockout, one empty impinger as an additional water knockout, an unheated CPM Teflon filter, an impinger containing 100 mL of water, an impinger with 200 grams of silica gel, and a dry gas metering console. The equipment was operated in accordance with EPA Methods 5 and 202.

At the end of each test run, the sampling train was leak checked. The sampling train was transferred to the sample recovery area. The nozzle, probe, and filter fronthalf were rinsed with acetone into a sample jar. The tared filter was recovered dry into another sample jar. The condensate from the first and second knockout impingers was poured into a tared reagent jar, weighed, and recorded. The condensate was then poured back into the second knockout impinger. The sampling train was purged with filtered UHP (ultra high purity) nitrogen from the inlet of the water cooled condenser through the CPM filter at 15 liters/minute for 60 minutes. During the purge, water was recirculated through the water-cooled condenser. A water bath was maintained around the 1st and 2nd knockout impingers. The temperature exiting the CPM Teflon filter was maintained between 66°F and 85°F.

The DI reagent and any condensate in the third impinger was poured into a graduated cylinder, measured, recorded, and discarded. The silica gel was returned to its original bottle, weighed, and recorded.

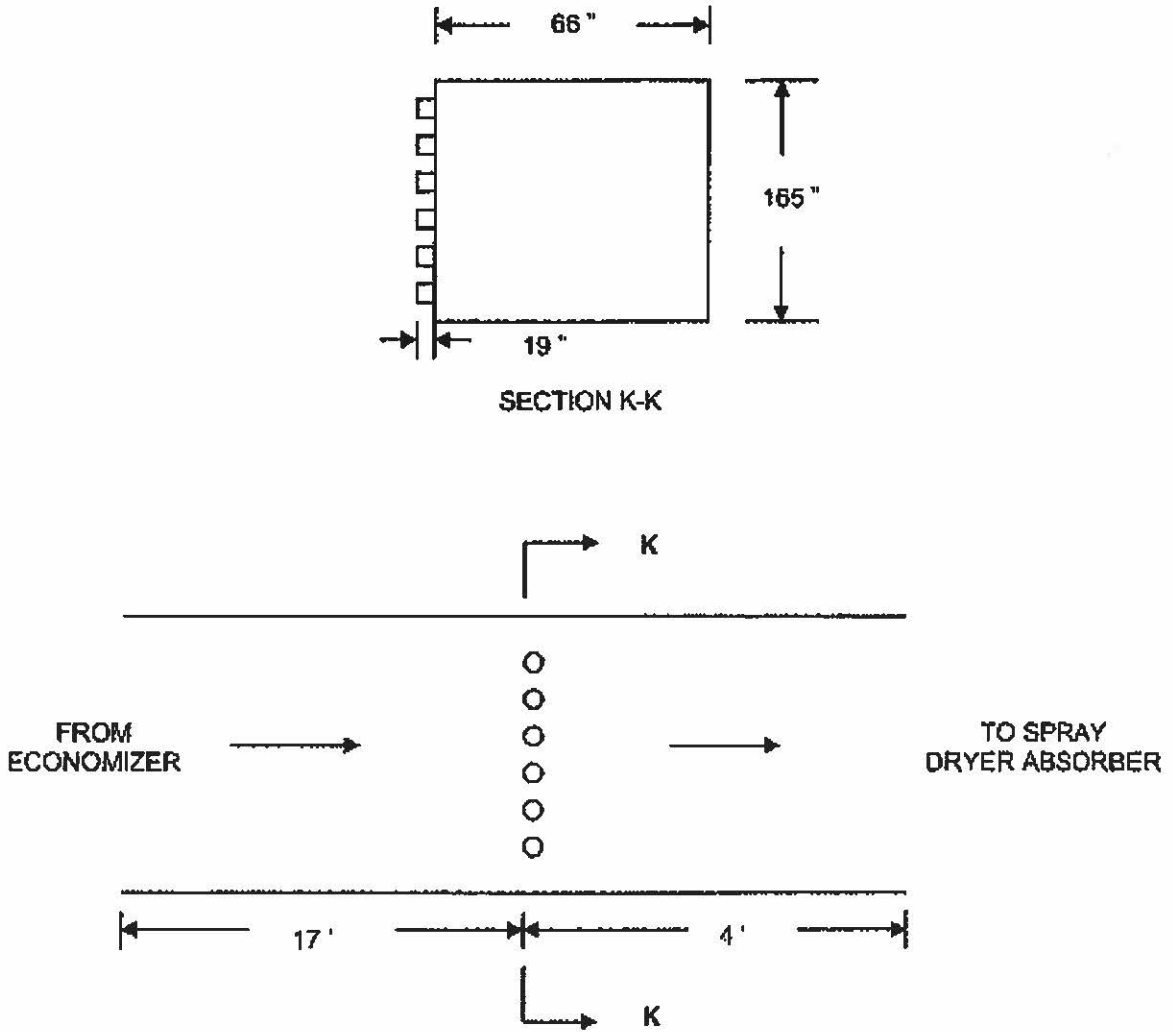


Figure 4-1. SDA Inlet Sampling Location
(Units 1, 2, & 3 are identical)

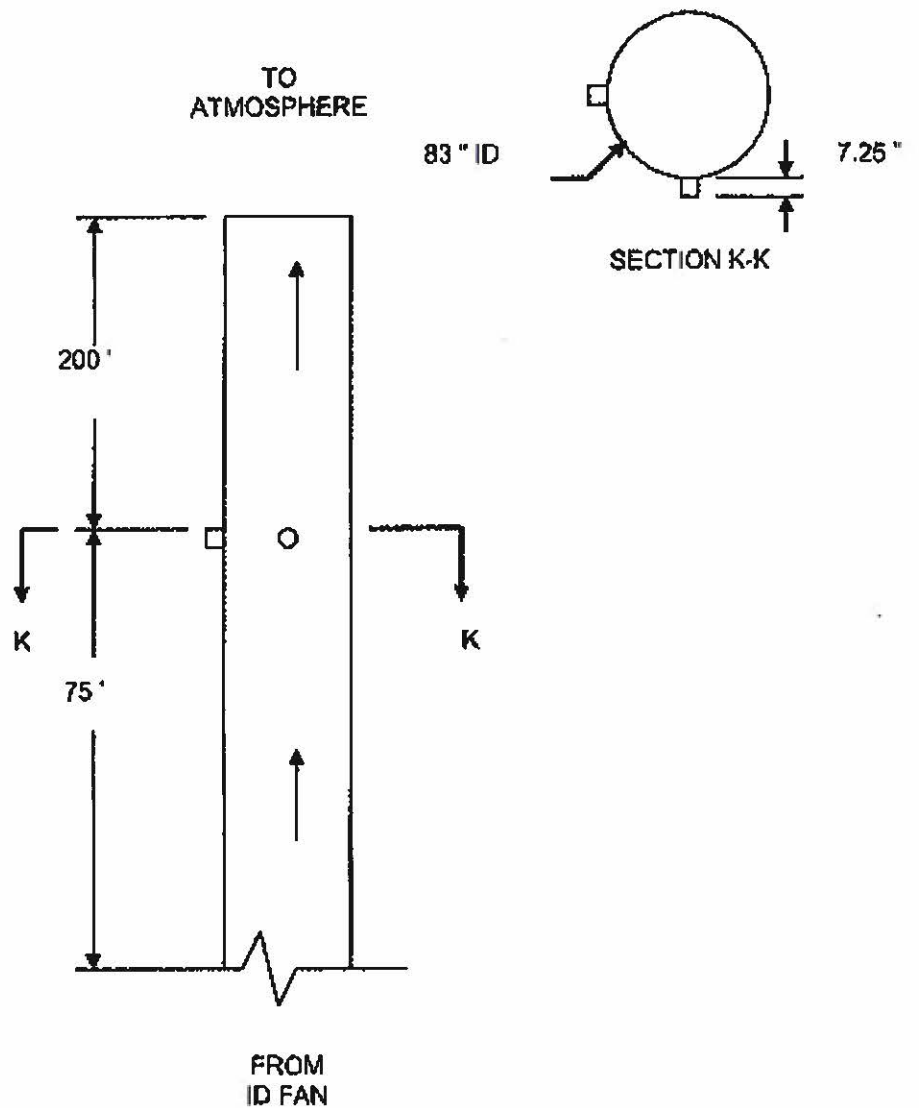


Figure 4-2. Stack Sampling Location
(Units 1, 2, & 3 are identical)

At the end of the purge, the contents of the 1st and 2nd knockout impingers were poured into a 500 mL glass reagent jar. The untared quartz filter backhalf, water-cooled condenser, 1st two empty impingers, fronthalf of the unheated CPM Teflon filter, and all connecting glassware was rinsed two times with degassed DI ultra-filtered water into the condensate moisture catch jar (from the 1st and 2nd impingers). Then the untared quartz filter backhalf, water-cooled condenser, 1st two empty impingers, fronthalf of the unheated CPM Teflon filter, and all connecting glassware, was rinsed once with acetone into a glass sample jar and twice with hexane into the same glass sample jar. The CPM Teflon filter was recovered into a separate sample jar.

One field blank sample train was recovered (impingers through CPM filter). The field blank train had 100 mL of degassed DI in the first impinger with a long stem at least one centimeter below the water level. The train was purged for one hour and recovered like a sample. Reagent blanks collected included 200 mL each of degassed DI water, acetone, and hexane directly from the squeeze bottles. The EPA Method 202 portions of the samples were kept below 85°F during transport to the analytical laboratory.

The condensate catch/DI rinse, acetone rinse/hexane rinse, and CPM Teflon filter were analyzed as per EPA Method 202 for condensable particulate. The CPM filter was desiccated and weighed to a constant weight. The condensate catch/DI rinse was extracted three times with hexane. These extracts were combined with the acetone/hexane rinse portion of the sample. The inorganic fraction was evaporated and desiccated to a constant weight. The acetone/hexane rinse (organic fraction) was evaporated and desiccated to a constant weight. The reagent blanks (150 mL) were evaporated and desiccated to constant weights. In accordance with EPA Method 202, Section 9.10, the total condensable particulate test run catch weights were corrected for the field blank value up to the maximum of 2.0 mg.

4.3 EPA Method 8 - Sulfuric Acid Mist

Sulfuric acid mist concentrations and emission rates were determined utilizing EPA Method 8. The EPA Method 8 sampling train consisted of a glass nozzle, a heated glass probe, a heated glass mat filter, one chilled impinger with 100mL of 80% IPA, an unheated glass mat filter, two chilled impingers each with 100mL of 3% H₂O₂, an impinger with 200 grams of silica gel, and a dry gas metering console. The equipment was operated in accordance with EPA Method 8 with no exceptions.

At the end of each test run, the contents of the IPA impinger were poured back into the original IPA reagent jar. The contents of the H₂O₂ impingers were poured back into the original H₂O₂ reagent jar. The silica gel was returned to its original container. The moisture catch was then determined gravimetrically. The nozzle, probe, and filter fronthalf were rinsed with IPA into a sample jar. The heated filter was placed into this sample jar. The filter backhalf, IPA impinger, fronthalf of

the second filter, connecting glassware, and the second filter itself were rinsed with DI water into the IPA reagent jar. The backhalf of the second filter, the H₂O₂ impingers, and connecting glassware were rinsed with DI water into the H₂O₂ reagent jar.

The front half portion of the samples was analyzed for sulfate as sulfuric acid mist using ion chromatography techniques rather than the Thorin titration per EPA Method 8. Ion chromatography is more accurate because it avoids interferences that are inherent in the titration procedure.

4.4 EPA Method 13B - Total Fluorides as Fluoride

Total fluorides as fluoride concentrations and emission rates were determined utilizing an EPA Method 13B sampling train. The sampling train consisted of a glass nozzle, a heated glass probe, a heated Whatman 541 filter, two chilled impingers each with 100mL of DI, an empty impinger, an impinger with 200 grams of silica gel, and a dry gas metering console. The equipment was operated in accordance with EPA Method 13B with no exceptions.

At the end of each test run, the contents of the first three impingers were poured back into the original reagent jar. The moisture catch was then determined gravimetrically. The nozzle, probe, filter holder, impingers, and connecting glassware were rinsed with DI into the sample jar. The filter was placed into the sample jar.

The samples were analyzed in accordance with EPA Method 13B for total fluorides as fluoride.

4.5 EPA Method 22 – Fugitive Emissions

The accumulated emissions time of fugitive emissions was determined by observing the combustion ash conveying/handling systems buildings and enclosures of ash conveying/handling systems during normal operations for three (3) one (1) hour periods. This method does not require that the opacity of emissions be quantified, but requires that the length of time that any visible fugitive emissions are observed be determined. Fugitive emissions include visible emissions from ash conveying/handling system buildings and enclosures including transfer points. If any fugitive emissions were observed during the observation period, the length of time that the emissions are visible was quantified using a stopwatch. The total accumulated time that fugitive emissions were observed is used to determine compliance with the fugitive emission limit.

4.6 EPA Method 23/Alternate Method 052 – Dioxins/Furans and PAHS

The concentrations and emissions rates of polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDD/PCDF or dioxins/furans) and polyaromatic hydrocarbons (PAHS) were determined utilizing EPA Method 23. The EPA Method 23 sampling train consisted of a glass nozzle,

a heated glass probe, a heated glassmat filter, a condenser, an XAD resin trap, an empty impinger, two chilled impingers each with 100mL of DI water, an empty impinger, an impinger with 200 grams of silica gel, and a dry gas metering console. The equipment was operated in accordance with EPA Method 23 with no exceptions.

At the end of each test run, the nozzle, probe, and filter fronthalf were rinsed with acetone into a sample jar. The filter was recovered dry into a glass petri dish. The filter backhalf, and condenser were rinsed with acetone into a sample jar. All of the components listed above up to the XAD resin trap were rinsed again with toluene into a sample jar. The XAD resin trap was sealed and placed into a chilled ice chest. The volume of water collected in the impingers was determined gravimetrically, then the water was discarded. The silica gel was poured back into its original container. The moisture catch was then determined gravimetrically.

PAHS analysis was performed on one of the units. Which samples are to be analyzed for PAHS is predetermined on a rotating schedule. For these samples, the following sample recovery was performed. The contents of the first four impingers were poured back into the original reagent jar. The impingers were rinsed with acetone into another sample jar. The silica gel was poured back into its original container. The moisture catch was then determined gravimetrically.

The samples were analyzed in accordance with EPA Method 23 for dioxins/furans. The samples from one of the units were also analyzed for PAHS.

4.7 EPA Methods 25A – Total Hydrocarbons

Oxygen, carbon dioxide, and total hydrocarbon concentrations were determined utilizing a continuous emissions monitoring (CEM) system as per EPA Methods 3A and 25A. This section presents the sample system description and operation. No deviations from EPA Methods were performed.

The CEM system consisted of an in stack probe, heated out of stack filter, heated transfer lines, condenser, unheated Teflon sample lines, sample pump, distribution manifold board, analyzers, and calibration gases. All components of the sampling system that are in contact with the sample are constructed of Teflon, glass, or stainless steel (316). Flue gas was extracted from the source through a three-point stainless steel probe. Flue gas was then passed through a heated Teflon sample line to a tee where the sample was split. Part of the sample remained heated to the hydrocarbon analyzer while the remainder of the sample was diverted into a condenser. This filtering system removes interferences such as particulate and moisture. Conditioned flue gas was then transported via Teflon tubing to a Teflon lined sample pump, through a distribution manifold, and on to various analyzers.

The integrity of this sampling system was verified (as per EPA Methods) using EPA Protocol 1 calibration gases. The design of this sampling system allows the operator to introduce calibration gases at the outlet of the probe, prior to the heated out of stack filter (for the system bias check and calibration drift check), and directly into the analyzers (for linearity checks).

A California Analytical Instruments, Inc. (CAI) Model 300 HFID Heated Hydrocarbon Analyzer was utilized for quantifying THC. This model analyzer uses Flame Ionization Detection (FID) to determine the total hydrocarbon concentration (on a wet basis) within a gaseous sample. The analyzer has an adjustable heated oven which contains a heated pump and a burner in which a small flame is elevated and sustained by regulated flows of air and a mixture of hydrogen and helium. The burner jet is used as an electrode and is connected to the negative side of a precision power supply. An additional electrode, known as the 'collector', is connected to a high impedance, low noise electronic amplifier. The two electrodes establish an electrostatic field. When a gaseous sample is introduced to the burner, it is ionized in the flame and the electrostatic field causes the charged particles (ions) to migrate to their respective electrodes. The migration creates a small current between the electrodes. This current is measured by the precision electrometer amplified and is directly proportional to the hydrocarbon concentration of the sample.

4.8 EPA Modified Method 26 – Hydrogen Chloride

Hydrogen chloride concentrations and emission rates were determined utilizing EPA Method 26 modified to use large impingers. The EPA Method 26 sampling train consisted of a heated glass probe, a heated quartz filter, two chilled impingers each with 100mL of 0.1N H₂SO₄, one empty impinger, an impinger with 200 grams of silica gel, and a dry gas metering console. The equipment was operated in accordance with EPA Method 26 except that large impingers were used for sample collection. The probe and filter temperatures were maintained between 248°F and 273°F.

At the end of each test run, the contents of the first three impingers were poured back into the original H₂SO₄ reagent jar. The silica gel was returned to its original container. The moisture catch in the components was determined gravimetrically. The filter backhalf and first three impingers were rinsed with DI water into the H₂SO₄ reagent jar.

The H₂SO₄ portion of the samples were analyzed in accordance with EPA Method 26 for hydrogen chloride.

4.9 EPA Method 29 - Metals

Metals concentrations and emission rates were determined utilizing EPA Method 29. The EPA Method 29 sampling train consisted of a glass nozzle, a heated glass probe, a heated quartz filter, two chilled impingers each with 100mL of 5%HNO₃/10%H₂O₂, an empty impinger, two chilled impingers each with 100mL of 4%KMnO₄/10%H₂SO₄, an impinger with 200 grams of silica gel, and a dry gas metering console. The equipment was operated in accordance with EPA Method 29 with no exceptions.

At the end of each test run, the nozzle, probe, and filter front half were rinsed with 100 mL of 0.1N nitric acid into a sample jar. The filter was recovered dry into another sample jar. The contents

of the 5% HNO_3 /10% H_2O_2 impingers were poured back into the original reagent jar. Any condensate in the empty impinger was poured into a sample jar. The 4% KMnO_4 /10% H_2SO_4 impingers were recovered into another sample jar.

The moisture catch was then determined gravimetrically. The filter backhalf and 5% HNO_3 /10% H_2O_2 impingers were rinsed with 100 mL of 0.1N nitric acid into the reagent jar. The empty impinger was rinsed with 100 mL of 0.1N nitric acid into a sample jar. The 4% KMnO_4 /10% H_2SO_4 impingers were rinsed with 100 mL of 4% KMnO_4 /10% H_2SO_4 and 100 mL of DI water into the jar containing the 4% KMnO_4 /10% H_2SO_4 reagent. The 4% KMnO_4 /10% H_2SO_4 impingers and connecting glassware were rinsed with 25mL of 8N HCl if any brown residue remained. This HCl rinse was added to a jar containing 200mL of DI water.

The inlet samples were analyzed in accordance with EPA Method 29 for mercury and the stack samples were analyzed in accordance with EPA Method 29 for metals.

4.10 Conditional Test Method 027 – Ammonia

Ammonia concentrations were determined utilizing Conditional Test Method 027 (CTM 027). The sampling train consisted of a glass nozzle, a heated glass probe, a heated glass mat filter, two chilled G-S impingers each with 100mL of 0.1N H_2SO_4 , an empty impinger, an impinger with 200 grams of silica gel, and a dry gas metering console. The equipment was operated isokinetically in accordance with CTM 027. The probe temperature was maintained above the stack temperature.

At the end of each test run, the contents of the impingers were poured back into the original reagent bottle. The silica gel was returned to its original container. The moisture catch in the components was determined gravimetrically. The nozzle, probe, and filter fronthalf were rinsed with 0.1N H_2SO_4 water into a sample jar. The filter was placed into a jar. The filter backhalf, impingers, and connecting glassware were rinsed with DI into the reagent bottle.

The samples were analyzed for ammonia using ion chromatography in accordance with CTM 027 for ammonia.

5.0 QA/QC RESULTS

5.1 QA/QC Policy Procedures

TESTAR Engineering, PC is committed to adhering to Quality Assurance/Quality Control (QA/QC) procedures and objectives that meet or exceed the relevant EPA guidance. Our procedures include calibration of equipment as appropriate, proper glassware pre-cleaning to prevent contamination of samples, proper sample recovery, documented sample custody, blank samples, duplicate analyses, matrix spike recovery, and validated computer generated results. We also adhere to other method specific criteria such as maintaining isokinetic conditions during particulate type testing and posttest leak checks.

TESTAR Engineering uses oil manometers to determine velocity differential pressures thus eliminating potential errors from magnetic gauges. The manometers are leveled and zeroed prior to taking any measurements. All equipment used onsite undergoes a pretest audit and operational check for accuracy. Dry gas meters are checked by using an orifice to determine the meter gamma. The audit gamma must be within 3% of the full test gamma for the meter to be acceptable. Likewise, all thermocouples are checked at ambient temperature versus an ASTM reference thermometer or a thermometer that has been checked against an ASTM reference thermometer. The reading must agree within 2°F. Additionally, the barometer is checked against a reference barometer prior to each project and must agree within 0.1" Hg.

After each testing project, the dry gas meter undergoes a posttest audit following the guidelines of Alternate Method 009. Alternate Method 009 utilizes a mathematical calculation to check the dry gas meter calibration factor (gamma) versus the full test calibration factor. The gamma must agree within ±5% of the full test gamma.

5.2 Sample Custody and Preservation

Proper sample custody and preservation techniques ensure that the samples collected and analyzed are the same, that the sample did not change in concentration prior to analysis, and that the sample was not tampered with prior to analysis. To ensure accurate results, TESTAR Engineering collects and transports samples in clean containers that are inert to the matrix enclosed, that will not contaminate the sample, and that prevent photochemical reactions when appropriate. All samples contain unique identifiers that include the client name, facility name, project number, collection date, unique run number, sample fraction, and matrix. Liquid levels are marked in order to determine if any leakage occurred during transport. Samples are accompanied by sample custody forms identifying the client, facility, project number, sample, fractions, collection date, etc. When custody is relinquished to the laboratory, the receiving sample custodian signs the form.

5.3 Sample Blanks, Duplicates, and Matrix Spikes

Several types of blanks are utilized depending upon the project QA objectives. Typical blanks include field blanks, reagent blanks, and trip blanks. Blanks help to identify the source of contamination if contamination is suspected based upon the result validation procedure. Trip blanks are typically not analyzed unless the field blank shows significant contamination. Field blanks and reagent blanks are analyzed during most testing programs involving metals unless requested not to do so by the client. Field blanks are analyzed during most programs involving organics such as dioxins/furans.

Duplicates and matrix spikes are analyzed for projects involving metals testing. At least 10% of the samples are analyzed in duplicate for metals and at least one matrix spike is performed. All mercury analyses are performed in duplicate.

Breakthrough analyses are performed for projects involving organics utilizing adsorbent tubes. Adsorbent tubes are desorbed and analyzed separately to determine if any breakthrough occurred. Breakthrough is said to have occurred if the organic catch weight on the last fraction (generally the backhalf of the last adsorbent tube) is more than 10% of the total train organic catch.

5.4 Data Validation and Presentation

The field test engineer is responsible for reviewing and validating data as it is obtained. Additionally the onsite project manager reviews data for consistency, completeness, and accuracy prior to leaving the site. This validation procedure is based upon their knowledge of the process being tested and/or similar sources as well as checks built into the software being utilized. This allows for error correction or for the testing to be repeated immediately rather than at a later undetermined date. The data undergoes another review by a Project Director upon return to headquarters. Analytical data is reviewed by the QA Director upon submittal by the analytical laboratory to resolve any conflicts or concerns as soon as possible rather than after the results have been calculated.

Data is collected using computerized spreadsheets in the field and the results are calculated using validated computer programs to prevent erroneous calculations.

5.5 QA/QC Results

This section presents QA/QC results from measures taken during the testing program. The results are summarized in the following tables for easy reference.

Table 5-1
Summary of QA/QC Procedures

Test Method	QA/QC Procedure	QA/QC Objective	QA/QC Results	Status of QA/QC
EPA M5	Acetone Blank	< 1.0E-05 mg/mg	1.27E-06 mg/mg	Acceptable
EPA M202	Acetone Blank	< 1.0E-06 mg/mg	1.27E-06 mg/mg	Acceptable
	Hexane Blank	< 1.0E-06 mg/mg	0.00E-06 mg/mg	Acceptable
	HPLC Water Blank	< 1.0E-06 mg/mg	1.00E-06 mg/mg	Acceptable
	Field Blank	NA	2.4, 2.2 mg	Acceptable, applied maximum blank correction of 2.0 mg
EPA M8	Reagent Blank	ND	<0.038, <0.024 mg	Acceptable
	H2SO4 In-house Audit	+ 10 %	3.75, 2.40 %	Acceptable
	H2SO4 Spike	90 - 110 %	102.3, 105.6 %	Acceptable
EPA M13B	DI Blank - F	ND	< 0.1 mg	Acceptable
	Duplicate RPD	< 10 %	< 0.0 %	Acceptable
	Spike Recoveries	90 - 110 %	94 - 96 %	Acceptable
EPA M23	Internal Standard Recoveries (4-6)	40 - 130 %	70.1 - 117 %	Acceptable
	Internal Standard Recoveries (7-8)	25 - 130 %	68.2 - 108 %	Acceptable
	Sampling Standard Recoveries	70 - 130 %	81.4 - 114 %	Acceptable
EPA M29	Duplicate RPD	< 20 %	< 12.6 %	Acceptable
	Spike Recoveries	75 - 125 %	74 - 111 %	Acceptable
Arsenic	Reagent Blank	NA	< 0.2 ug	Acceptable
Beryllium	Reagent Blank	NA	< 0.05 ug	Acceptable
Cadmium	Reagent Blank	NA	< 0.2 ug	Acceptable
Chromium	Reagent Blank	NA	1.18, 1.12 ug	Acceptable, blank correction
Lead	Reagent Blank	NA	< 0.2, 0.637 ug	Acceptable
Nickel	Reagent Blank	NA	0.618, 0.711 ug	Acceptable, blank correction
Mercury	Reagent Blank	ND	< 0.5 ug	Acceptable
	Duplicate Inj RPD	< 10 %	< 3.6 %	Acceptable
	Duplicate Ana. RPD	< 20 %	< 9.0 %	Acceptable
	Spike Recoveries	75 - 125 %	86 - 121 %	Acceptable
CT M027	H2SO4 Reagent Blank	ND	<0.092, <0.095 mg	Acceptable
	DI Reagent Blank	ND	<0.046, < 0.047 mg	Acceptable
	Field Blank	ND	<0.184, <0.118 mg	Acceptable
	NH3 Audit	+ 10 %	2.87, - 4.41 %	Acceptable
	NH3 Spike	90 - 110 %	98.7, 98.3 %	Acceptable

1. The beryllium spike recovery for sample 1-S-M29-4 and the arsenic and cadmium spike recoveries for samples 2-S-M29-4 and 3-S-M29-6 were outside the laboratory guidelines of $\pm 25\%$ recovery. As per Reference Method 29, the samples were re-analyzed at a five-fold dilution resulting in acceptable spike recoveries, indicating a matrix interference. Therefore, the results are considered valid. Refer to Appendix C.3 for further discussion.